

## **ABSTRACT**

A system for providing high-resolution display for a matrix output device, such as a Photo-Multiplier Tube (PMT) matrix, that requires a substantially less number of amplifiers than prior readout systems. A resistor matrix is coupled directly to the outputs of a matrix output device. The outputs in each row in the matrix are combined and amplified with an amplifier that is at an end of each row. Similarly, the outputs in each column of the matrix are combined and amplified with an amplifier at an end of each column. The amplifiers at the end of each row and column also provide conversion of the signals from a current to a voltage. The converted and amplified signals are then processed, using a simple yet accurate algorithm such as center of gravity interpolation, to determine location and other information. The determined information may relate to detection of photons on the PMTs, for example, and is provided as an output signal from the processing circuitry. The output signal from the processing circuitry can be sent to a display device such as a video monitor for display and further analysis of the determined information. The present imaging readout system provides substantial savings in the cost of production and operation of PMT systems, which typically have thousands of outputs requiring amplification for readout.